

# **Quick Summary of Glacier NP GRI meeting August 20-22, 2002**

## **Summary**

A geologic resources inventory workshop was held for Glacier NP (GLAC) on August 20-22, 2002 to view and discuss the park's geologic resources, to address the status of geologic mapping for compiling both paper and digital maps, and to assess resource management issues and needs. Cooperators from the NPS Geologic Resources Division (GRD), Natural Resources Information Division (NRID), NPS Glacier NP, the Montana Bureau of Mines and Technology, the Canadian Geological Survey, Parks Canada and other academics were present for the workshop.

This involved a field trip to view the geology of the Glacier NP area and a scoping session to present overviews of the NPS Inventory and Monitoring (I&M) program, the Geologic Resources Division, and the on-going Geologic Resources Inventory (GRI). Round table discussions involving geologic issues for Glacier NP included interpretation, the status of geologic mapping efforts, sources of available data, and action items generated from this meeting.

Currently, some of the biggest geologic issues the park faces are retreat of its glaciers (it's estimated that they will all be melted by 2030) and landslides and geologic hazards along Going to the Sun Road.

**For a list of Attendees and their contact information, see the last page of this document.**

## **OVERVIEW OF GEOLOGIC RESOURCES INVENTORY (GRI)**

The NPS GRI has the following goals:

1. to assemble a bibliography of associated geological resources for NPS units with significant natural resources ("GRBIB") to compile and evaluate a list of existing geologic maps for each unit,
2. to conduct a scoping session for each park,
3. to develop digital geologic map products, and
4. to complete a geological report that synthesizes much of the existing geologic knowledge about each park.

It is stressed that the emphasis of the inventory is **not** to routinely initiate new geologic mapping projects, but to aggregate existing "baseline" information and identify where serious geologic data needs and issues exist in the National Park System. In cases where map coverage is nearly complete (ex. 4 of 5 quadrangles for Park "X") or maps simply do not exist, then funding may be available for geologic mapping.

After introductions by the participants, Tim Connors and Bruce Heise (both NPS-GRD) presented overviews of the Geologic Resources Division, the NPS I&M Program, the

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status of the natural resource inventories, and the GRI in particular.

They also presented a demonstration of some of the main features of the GRI digital geologic database. This has become the prototype for the NPS digital geologic map model as it reproduces all aspects of a paper map (i.e. it incorporates the map notes, cross sections, legend etc.) with the added benefit of being geospatially referenced. It is displayed in ESRI ArcView shape files and features a built-in Microsoft Windows help file system to identify the map units. It can also display scanned JPG or GIF images of the geologic cross sections supplied with the paper "analog" map. Geologic cross section lines (ex. A-A') are subsequently digitized as a line coverage and are hyperlinks to the scanned images.

Tim further demonstrated the developing NPS Theme Manager for adding GIS coverage's into projects "on-the-fly". With this functional browser, numerous NPS themes can be added to an ArcView project with relative ease. Such themes might include geology, paleontology, hypsography (topographic contours), vegetation, soils, etc.

### ***GRBIB***

At the scoping session, individual Microsoft Word Documents of Geologic Bibliographies for GLAC were distributed.

The sources for this compiled information are as follows:

- AGI (American Geological Institute) GeoRef
- USGS GeoIndex
- ProCite information taken from specific park libraries

These bibliographic compilations were validated by GRI staff to eliminate duplicate citations and typographical errors, as well as to check for applicability to the specific park. After validation, they become part of a Microsoft Access database parsed into columns based on park, author, year of publication, title, publisher, publication number, and a miscellaneous column for notes.

From the Access database, they are exported as Microsoft Word Documents for easier readability, and eventually turned into PDF documents. They are then posted to the GRI website at: <http://www2.nature.nps.gov/grd/geology/gri/products/geobib/> for general viewing.

### ***EXISTING GEOLOGIC MAPS***

After the bibliographies were assembled, a separate search was made for any existing surficial and bedrock geologic maps for GLAC. The bounding coordinates for each map were noted and entered into a GIS to assemble an index geologic map. Separate coverage's were developed based on scales (1:24,000, 1:100,000, etc.) available for the specific park. Numerous geologic maps at varying scales and vintages cover the

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area. Index maps were distributed to each workshop participant during the scoping session.

### **Geologic Mapping:**

At present, the USGS has produced numerous publications on the Geology of Glacier NP. Their I-1508 map series has both bedrock (Whipple, J.W., 1992, Geologic map of Glacier National Park, Montana, US Geological Survey, I-1508-F, 1:100000 scale) and surficial (Carrara, P.E., 1990, Surficial geologic map of Glacier National Park, Montana, US Geological Survey, I-1508-D, 1:100000 scale) geologic paper maps covering the current park boundary.

The general consensus of those cooperators at the meeting was that these existing maps were quite adequate for resource management purposes.

Suggested improvements included upgrading a layer showing geologic hazards and landslides, as well as further refinement of a few surficial units.

### ***Digital Geologic Map coverage:***

The GLAC GIS staff has obtained completed digital geologic coverages for the two maps mentioned above along with FGDC compliant metadata. Tim Connors previewed this data to the group and Richard Menicke also showed an image of the geology draped over a shaded relief map to illustrate the bedrock control on the topography.

Apparently, these maps were digitized out of North Carolina State University. They captured geologic polygons on both maps, but excluded other coverages from the bedrock map such as folds, faults, contact line types, cross sections, etc. It will be likely that GRI staff will have to re-digitize these maps to capture this other necessary attribute data, but we will try to work with the existing linework and match it up to the original attributes on paper as best as possible.

These coverages are currently downloadable from:  
[http://www.nps.gov/gis/available\\_data](http://www.nps.gov/gis/available_data)

### **Other desired GIS data:**

Soils maps are also of interest to GLAC staff. Tim Connors will check with Pete Biggam (NPS-Soil Scientist) on the status of soils mapping for the area; will require more follow-up.

### **Miscellaneous:**

Another bibliography was distributed by David Butler to some meeting attendees; needs to be compared and synthesized into our GRBIB.



# List of Attendees Glacier NP GRI meeting August 20-22, 2002

NAME		ORG	AFFILIATION	TITLE	PHONE	E-MAIL	Field Trip	Scoping Session
Berger	Tony	Academic		Geologist	250-480-0840	aberger@uvic.ca	yes	Yes
Biggam	Pete	federal	NPS, Natural Resources Information Division	soil scientist	(303) 987-6948	Pete_Biggam@nps.gov	Yes	Yes
Butler	David	academic	Southwest Texas State University	Geologist	512-245-7977	db25@swt.edu	Yes	Yes
Campbell	Walt	federal	USGS	IM coordinator, Rocky Mt. Network	970-226-9487	walton.campbellj@att.net	Yes	Yes
Carolin	Tara	federal	NPS-GLAC	ecologist	406-888-7919	tara_carolin@nps.gov		
Connors	Tim	federal	NPS, Geologic Resources Division	geologist	(303) 969-2093	Tim_Connors@nps.gov	Yes	Yes
Covington	Sid	federal	NPS, Geologic Resources Division	geologist	(303) 969-2154	Sid_Covington@nps.gov	Yes	Yes
Deal	Ed	state	Montana Bureau of Mines and Geology	geologist		edeal@mtech.edu	Yes	Yes
Dolan	Bill	federal	NPS-Waterton Lakes	chief park warden	403-859-5118	bill.dolan@pc.gc.ca		yes
Fagre	Dan	federal	USGS	ecologist	406-888-7922	dan_fagre@usgs.gov	Yes	Yes
Gonzalez	Ignacio	academic	University of Saskatchewan	geologist	306-966-8591	iag140@mail.usask.ca	Yes	Yes
Graham	John	academic	Colorado State University, GRI report writer	geologist	970-225-6333	jpgraham250@msn.com	Yes	Yes
Gregson	Joe	federal	NPS, Natural Resources Information Division	physical scientist	(970) 225-3559	Joe_Gregson@nps.gov	Yes	Yes
Heise	Bruce	federal	NPS, Geologic Resources Division	geologist	(303) 969-2017	Bruce_Heise@nps.gov	Yes	Yes
Higgins	Bob	federal	NPS, Geologic Resources Division	geologist	(303) 969-2018	Bob_Higgins@nps.gov	Yes	Yes
KellerLynn	Katie	academic		geologist	970-586-7243	katie.david@prodigy.net	Yes	Yes
Malanson	George	academic	University of Iowa	ecologist	319-335-0540	george-malanson@uiowa.edu	Yes	Yes
Marnell	Leo	federal	NPS-GLAC	biologist	406-888-7995	leo_marnell@nps.gov		
Martin	Larry	federal	NPS-WRD	hydrogeologist	970-225-3515	larry_martin@nps.gov	Yes	Yes
McNeil	Ron	academic	University of Lethbridge	soil scientist	403-320-5099	landys@telusplanet.net	Yes	Yes
Menicke	Richard	federal	NPS-GLAC	GIS	406-888-7918	richard_menicke@nps.gov		Yes
Michels	Bill	federal	NPS-GLAC	natural resources		bill_michels@nps.gov		
Ozaki	Vicki	federal	NPS-REDW	geologist	707-825-5142	vicki_ozaki@nps.gov	Yes	Yes
Pellatt	Marlow	federal	Parks Canada	paleontologist	604-666-2556	marlow_pellatt@pc.gc.ca		
Potter	Jack	federal	NPS-GLAC	chief ranger	406-888-7821	jack_potter@nps.gov	Yes	Yes
Relyea	Scott	academic	Flathead Lake Biological Station	research coordinator	406-982-3301, ext. 222	srelyea@selway.umn.edu		
Schumann	Randy	federal	USGS	geologist	303-236-5344	rschumann@usgs.gov	Yes	Yes
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Tonnessen	Kathy	academic	University of Montana	research coordinator		kat@forestry.umn.edu	Yes	Yes
Welch	David	academic	Parks Canada		819-994-5532	david.welch@pc.gc.ca	Yes	Yes
Wood	Jim	federal	NPS, Geologic Resources Division	physical scientist	(303) 969-2149	Jim_F_Wood@nps.gov	yes	Yes